

PATENT SPECIFICATION

NO DRAWINGS

Inventors: HARRIS B. PARMELE and CLIFFORD OLIVER JENSEN

903.067



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COMPLETE SPECIFICATION

Smoking Tobacco Product

We, P. LORILLARD COMPANY, a corporation organised under the laws of the State of New Jersey, United States of America, of 200 East 42nd Street, New York 17, New York United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to smoking tobacco products and has particular reference to methods of imparting to tobacco the property of rendering inactive those components in tobacco smoke which are considered to be harmful to the consumer, and the invention further relates to products having that property.

This application discloses a modification of the subject matter of the applicants' co-pending Application No. 38322/58 (Serial No. 863,287), which disclosed a tobacco product and methods of producing the same which product when smoked has the effect of decreasing the quantity of the volatilisable components in tobacco smoke which are believed by some investigators to be, or contain products which are, harmful to smokers in that they irritate the sensitive tissues of the respiratory tract and may eventually lead to carcinogenic conditions. Such components are included within that class which is loosely termed tobacco "tar", an extremely complex mixture of a great number of organic compounds, including nicotine, some of which are aromatic and fragrant and thus contribute to the pleasure of smoking, whereas others, particularly the polycyclic or polynuclear hydrocarbons, although occurring in very small concentrations in the tobacco smoke, are believed to be the major irritating compounds and therefore undesirable.

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The said co-pending application proposed to modify, by what is believed to be a catalytic action, with calcium oxide or a mixture of iron oxide and calcium oxide which is added to the tobacco during the manufacture, those polycyclic or polynuclear hydrocarbons which result from the combustion of the tobacco, which at the "glow point" of a cigarette during a "draw" reaches temperatures of the order of 880° C. It was therefore concluded that such hydrocarbons are the product of thermal cracking at the point of combustion and that by incorporating certain catalysts or catalyst-forming compounds in the tobacco product, catalytic cracking or other similar effect is added to thermal cracking at the combustion point. Certainly, the tar (including nicotine) content of the smoke is decreased.

In accordance with the present invention a smoking tobacco product includes tobacco and about .5% to 10% of the dry weight of the tobacco of calcium carbonate distributed substantially uniformly throughout the smoking product whereby the volatile polynuclear hydrocarbons normally released during the smoking of the tobacco are substantially eliminated from the smoke evolved on the combustion of the treated tobacco. Preferably, the smoking product includes iron oxide in addition to the calcium carbonate.

As stated, the co-pending patent application discloses the modification of the volatile products of the tobacco by the addition of calcium oxide or a mixture of calcium oxide and iron oxide. The desirable modification of the volatile components which is found to take place where calcium carbonate is added may be due to catalytic action following the decomposition or calcining of the calcium carbonate, according to the equation $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$, which is believed to occur at

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about 825° C., the temperature of combustion of tobacco at the combustion zone or "glow point" of the cigarette during a "draw" being about 880° C. It is possible that the carbon dioxide released also has some contributing modifying effect on the polycyclic or polynuclear hydrocarbons. The precise chemical reactions which take place, however, are not fully understood but experiments have been carried out to verify that the tar content of the smoke from tobacco which has been treated by a method according to the invention is reduced, and will be described later.

The methods which were described in the applicants' copending application for treating the tobacco with the hydrocarbon reducing additive, which is in that case calcium oxide or a mixture of calcium oxide and iron oxide, are also suitable for treating the tobacco with calcium carbonate in accordance with the present invention. The tobacco, while still in the natural leaf form or in the form of reconstituted tobacco, or as flakes or shreds of tobacco leaf, can be coated or impregnated with the hydrocarbon-modifying or decreasing additive, by dusting or otherwise applying the same to the moist tobacco in finely divided solid form, by coating or impregnating the tobacco with a true solution of the additive in a suitable solvent which on evaporation leaves no toxic or taste-impairing residue, by coating or impregnating the tobacco with the additive colloiddally dispersed in or otherwise mixed as a slurry with a suitable vehicle which leaves no toxic or taste-impairing residue, or by applying thermally responsive salts or other compounds of the additive which decompose or are otherwise converted to the desired additive *in situ* at the combustion temperature of the tobacco.

Between about 0.5 and 5% by dry weight of calcium carbonate to tobacco has been found to be an effective concentration although, because of the inert-to-human membrane nature of the calcium carbonate, larger percentages may be safely employed, for example up to 10% by dry weight but not materially more, since the effects thereof are not helpful beyond that point.

As stated, the operation of such additives

is not fully understood but it is believed to be catalysis since the expected residue of such additives remains unchanged in nature or quantity, although the tobacco smoke is modified or changed to eliminate or materially decrease the quantity of polynuclear or polycyclic hydrocarbons. The polycyclic or polynuclear hydrocarbons which occur or are usually found in tobacco smoke are anthracene, benzpyrene, pyrene, alkyl pyrene and alkyl phenanthrene. It is known that tobacco smoke contains about twenty-three parts per million of tar, of which more than half consists of the aforementioned polynuclear hydrocarbons.

In order specifically to determine the effect of the additive on tobacco smoke, a substantial number of cigarettes not containing additive were machine-smoked and the tars extracted from the smoke, and compared with the tars extracted from the smoke of a substantial number of machine-smoked cigarettes the tobacco of which was uniformly coated with finely-divided calcium carbonate which was dusted on to the moist tobacco before it was made into cigarettes. By "machine-smoked" is meant that suction is intermittently applied to the lighted cigarettes in a manner fairly simulating the degree and frequency of the "draw" of the average cigarette smoker. Thus, in order to collect a substantial quantity of tars for thorough analysis and also to obtain a fair average result and preclude inexact results because of some unforeseeable difficulty such as impairment of the smoking machine (although none occurred), 37,175 filterless cigarettes without additive were so smoked and the tars in the smoke collected, and 24,213 filterless cigarettes of the same manufacture or brand but containing 5% dry weight of calcium carbonate were so smoked and the tars in the smoke collected in the same way. In each case the tars were condensed from the smoke and extracted with pure benzene in which the pertinent portions are freely soluble. The benzene-soluble tars in each case were analysed chromatographically for presence and quantity of polycyclic or polynuclear hydrocarbons, with the following results:—

	Polynuclear HC Component	Without Additive Amount (ppm) in Benzene-soluble Tar	With CaCO ₃ Amount (ppm) in Benzene-soluble Tar
105	Anthracene	0.0 (undetectable)	0.0 (undetectable)
	Benzpyrene	1.2	0.0
	Pyrene	3.5	0.1
	Alkyl pyrene	0.8	0.2
	Alkyl phenanthrene	10.5	2.0
110		16.0	2.3

The 85+ % decrease in the quantity of polynuclear or polycyclic hydrocarbons and the total elimination of benzpyrene and virtual elimination of pyrene and alkyl pyrene,

demonstrates the effectiveness of calcium carbonate, which is generally recognised as being essentially non-toxic and otherwise harmless. It is observed that anthracene was not detectable in either case, which, because of the exhaustive nature of the analysis, indicates that if present it is in such exceedingly small quantity as to be sensibly absent.

Inasmuch as the aforementioned hydrocarbons are eliminated or materially decreased by the additive at the point where they volatilise, i.e. the combustion zone or "glow point" of the tobacco during a "draw", they do not recondense in the cooler tobacco behind the glow point and thus are not revolatilised and hence do not reach the smoker. Also, inasmuch as the unconsumed portion of the cigarettes behind the "glow point" remains materially below the temperature of decomposition of the calcium carbonate on or in the unconsumed tobacco, the carbonate remains inert until the glow point reaches it and the tobacco carrier.

It will be seen that the novel method of this invention imparts to the tobacco the property of purging its smoke of polynuclear or polycyclic hydrocarbons at the combustion zone where and as they are formed. The invention thus permits tobacco to be smoked safely without requiring a filter or, if a filter is nevertheless desired to remove larger particles of tar in the tobacco smoke, the invention eliminates those objectionable hydrocarbons which cannot be or are incompletely removed by the majority of commercial filters used today.

We are aware of the Customs and Excise

Act, 1952 (15 and 16 Geo. 6 and 1. Eliz 2, Ch. 44) and we make no claim to use the invention in contravention of any of the provisions of that Act.

WHAT WE CLAIM IS:—

1. A tobacco smoking product including tobacco and about .5% to 10% of the dry weight of the tobacco of calcium carbonate distributed substantially uniformly throughout the smoking product whereby the volatile polynuclear hydrocarbons normally released during the smoking of tobacco are substantially eliminated from the smoke evolved on combustion of the treated tobacco.

2. A tobacco product according to Claim 1, including iron oxide, added to the tobacco, in addition to calcium carbonate.

3. A method of making a tobacco product according to Claim 1 or Claim 2, in which the tobacco is coated with the additive in a finely divided solid form.

4. A method according to Claim 3, in which the additive is applied when dry to moistened tobacco.

5. A method according to Claim 4, in which the treated tobacco is dried so as to leave it coated with the additive.

6. A method of treating tobacco substantially as herein described.

7. A smoking tobacco product substantially as herein described.

Agents for the Applicants:
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
51/52, Chancery Lane,
London, W.C.2.

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